

WHAT IS CLAIMED IS:

1. A device for securing a spinal rod to the spine comprising:

a) a head portion having a channel extending therethrough

configured to receive a spinal rod;

b) a locking cap configured to engage an interior camming

surface of the channel and an exterior surface of the spinal rod upon rotation of the

locking cap relative to the head portion to secure the position of the head portion relative

to the spinal rod; and

c) a fastener portion formed monolithic with and depending

from the head portion and configured to engage the spine.

2. A device as recited in Claim 1, wherein the channel is bounded by
opposed side walls.

3. A device as recited in Claim 2, wherein each of the opposed side
walls has an arcuate engagement slot defined therein.

4. A device as recited in Claim 3, wherein the locking cap has

opposed arcuate engagement flanges configured for reception in the opposed arcuate

engagement slots of the head portion upon rotation of the locking cap relative to the head
portion.

5. A device as recited in Claim 4, wherein the locking cap is

configured for rotation between an initial position in which the arcuate engagement

flanges are 90° out of phase with the arcuate engagement slots, an intermediate position

in which the arcuate engagement flanges are 45° out of phase with the arcuate

engagement slots and a locked position in which the arcuate engagement flanges are in phase and intimately engaged with the arcuate engagement slots.

6. A device as recited in Claim 5, wherein the bottom surface of the locking cap includes an elongate recess oriented to accommodate a spinal rod when the locking cap is in an initial position.

7. A device as recited in Claim 6, wherein the bottom surface of the locking cap includes an orthogonal recess which intersects the elongate recess at a 90° angle to accommodate a spinal rod when the locking cap is in a locked position.

8. A device as recited in Claim 6, wherein the bottom surface of the locking cap includes at least one transverse recesses which intersects the elongate recess at a 45° angle to accommodate a spinal rod when the locking cap is in an intermediate position.

9. A device as recited in Claim 1, wherein the locking cap has a cylindrical head which includes a hexagonal bore for receiving a work implement.

10. A device as recited in Claim 1, wherein the locking cap has a hexagonal head configured for reception by a work implement.

11. A device as recited in Claim 3, wherein the opposed engagement slots are each defined in part by inclined slot surfaces, with the angle of the inclined slot surface of one engagement slot being opposite that of the opposed engagement slot, and wherein the opposed engagement flanges are each defined in part by inclined flange

surfaces, with the angle of the inclined flange surface of one engagement flange being opposite that of the opposed engagement flange.

12. A device as recited in Claim 11, wherein the inclined slot surfaces
5 and the inclined flange surfaces are angularly tapered to complement each other.

13. A device as recited in Claim 1, wherein the fastener portion is
configured as a screw.

10 14. A device as recited in Claim 1, wherein the fastener portion is
configured as a hook.

15 15. A device for securing a spinal rod to the spine comprising:
a) a head portion having a channel extending therethrough
15 defining a vertical axis and a horizontal axis, and configured to receive a spinal rod along
the horizontal axis;
b) a locking cap configured for reception by the head portion
along the vertical axis of the channel and adapted to engage an interior surface of the
channel and an exterior surface of the spinal rod upon rotation of the locking cap about
20 the vertical axis to secure the position of the head portion relative to the spinal rod; and
c) a fastener portion formed monolithic with and depending
from the head portion and configured to engage the spine.

25 16. A device for securing a spinal rod to the spine comprising:
a) a head portion having a channel extending therethrough for
receiving a spinal rod;

b) a locking cap configured to cooperate with an interior camming surface of the channel and an exterior surface of the spinal rod upon rotation of the locking cap relative to the head portion between an unlocked position and a locked position to secure the position of the head portion relative to the spinal rod; and

5 c) a fastener portion formed monolithic with and depending from the head portion and configured to engage the spine.

10 17. A device as recited in Claim 16, wherein the locking cap is configured for rotation from the unlocked position to a partially locked intermediate position.

15 18. A device as recited in Claim 16, wherein the channel is bounded by opposed side walls each having an arcuate engagement slot defined therein, and the locking cap has opposed arcuate engagement flanges configured for reception in the opposed arcuate engagement slots upon rotation of the locking cap into the locked position.

20 19. A device as recited in Claim 17, wherein the locking cap has a bottom surface which includes an elongate recess oriented to accommodate a spinal rod when the locking cap is in the unlocked position, an orthogonal recess which intersects the elongate recess at a 90° angle to accommodate a spinal rod when the locking cap is in the locked position, and at least one transverse recesses which intersects the elongate recess at a 45° angle to accommodate a spinal rod when the locking cap is in the partially locked intermediate position.

20. A device as recited in Claim 18, wherein the opposed engagement slots are each defined in part by inclined slot surfaces, with the angle of the inclined slot surface of one engagement slot being opposite that of the opposed engagement slot, and wherein the opposed engagement flanges are each defined in part by inclined flange surfaces, with the angle of the inclined surface of one engagement flange being opposite that of the opposed engagement flange.

21. A device as recited in Claim 20, wherein the inclined slot surfaces and the inclined flange surfaces are angularly tapered to complement each other.

22. A device as recited in Claim 16, wherein the fastener portion is configured as a screw.

23. A device as recited in Claim 16, wherein the fastener portion is configured as a hook.

24. A device for securing a spinal rod to the spine comprising:
a) a head portion having a channel extending therethrough for receiving a spinal rod, the channel being bounded by opposed side walls, each side wall having an arcuate engagement slot defined therein,

b) a locking cap having a bottom surface configured to accommodate a spinal rod extending through the channel of the head portion and including opposed arcuate engagement flanges configured for cammed reception in the opposed arcuate engagement slots of the head portion upon rotation of the locking cap relative to the head portion to secure the position of the head portion relative to the spinal rod; and

c) a fastener portion formed monolithic with and depending from the head portion and configured to engage the spine.

25. A device as recited in Claim 24, wherein the locking cap is
5 configured for rotation between an initial position in which the arcuate engagement
flanges are 90° out of phase with the arcuate engagement slots, an intermediate position
in which the arcuate engagement flanges are 45° out of phase with the arcuate
engagement slots and a locked position in which the arcuate engagement flanges are in
10 phase and intimately engaged with the arcuate engagement slots.

26. A device as recited in Claim 24, wherein the bottom surface of the
locking cap includes a first recess oriented to accommodate a spinal rod when the locking
cap is in the initial position.

15 27. A device as recited in Claim 26, wherein the bottom surface of the
locking cap includes a second recess which intersects the first recess at a first angle to
accommodate a spinal rod when the locking cap is in the locked position.

20 28. A device as recited in Claim 26, wherein the bottom surface of the
locking cap includes a third recess which intersects the first recess at a second angle to
accommodate a spinal rod when the locking cap is in the intermediate position.

25 29. A device as recited in Claim 26, wherein the first recess is an
elongate recess.

30. A device as recited in Claim 27, wherein the second recess intersects the first recess at a 90° angle.

31. A device as recited in Claim 28, wherein the third recess intersects the first recess at a 45° angle.

32. A device as recited in Claim 24, wherein the channel is defined in part by a hemi-cylindrical seat for accommodating a cylindrical spinal rod.

33. A device as recited in Claim 24, wherein the locking cap includes a cylindrical head having a hexagonal bore defined therein for receiving a work implement.

34. A device as recited in Claim 33, wherein the opposed side walls of the head portion include opposed arcuate notches for accommodating the cylindrical head of the locking cap.

35. A device as recited in Claim 24, wherein an arcuate appendage projects upwardly from each side wall of the head portion to engage an annular recess formed in an upper portion of the locking cap.

36. A device as recited in Claim 35, wherein the upper portion of the locking cap has a hexagonal configuration for reception by a working implement.

37. A device as recited in Claim 24, wherein the opposed engagement slots are each defined in part by inclined slot surfaces, with the angle of the inclined slot surface of one engagement slot being opposite that of the opposed engagement slot, and the opposed engagement flanges are each defined in part by inclined flange surfaces, with

the angle of the inclined flange surface of one engagement flange being opposite that of the opposed engagement flange.

38. A device as recited in Claim 37, wherein the inclined slot surfaces
5 and the inclined flange surfaces are angularly tapered to complement each other.

39. A device as recited in Claim 24, wherein the fastener portion is
configured as a bone screw.

10 40. A device as recited in Claim 24, wherein the fastener portion is
configured as a bone hook.

41. A device for securing a spinal rod to the spine comprising:

15 a) a head portion having a channel extending therethrough
configured to receive a spinal rod;

b) a locking cap including a first portion configured to engage
an interior surface of the head portion and a second portion configured to engage an
exterior surface of a spinal rod received by the channel to secure the position of the head
portion relative to the spinal rod; and

20 c) a fastener portion depending from the head portion and
configured to engage the spine.

42. A device as recited in Claim 41, wherein the first portion of the
locking cap is mechanically joined to the second portion of the locking cap.

43. A device as recited in Claim 42, wherein the first portion of the locking cap is configured to rotate relative to the second portion of the locking cap.

44. A device as recited in Claim 43, wherein the first portion of the locking cap includes a bottom surface having an axial reception bore defined therein and the second portion of the locking cap includes an upper surface having an axial post extending therefrom configured to engage the axial reception bore in the first portion of the locking cap.

45. A device as recited in Claim 42, wherein the channel in the head portion is bounded by opposed side walls each having an arcuate engagement slot formed therein, and the first portion of the locking cap has opposed arcuate engagement flanges configured for reception in the opposed arcuate engagement slots of the head portion.

46. A device as recited in Claim 41, wherein a bottom surface of the second portion includes an elongated recess oriented to accommodate a spinal rod.

47. A device as recited in Claim 41, wherein the head portion defines a central axis extending perpendicular to the channel, and the fastener portion is configured for angular movement relative to the central axis of the head portion.

48. A device as recited in Claim 47, wherein the fastener portion includes a spherical head and a threaded body depending from the spherical head.

49. A device as recited in Claim 48, wherein the head portion defines a seat for accommodating the spherical head and an aperture for accommodating the threaded body depending from the spherical head.

5 50. A device as recited in Claim 41, wherein the head portion is formed monolithic with the fastener portion.

51. A device for securing a spinal rod to the spine comprising:

- 10 a) a head portion having a channel extending therethrough configured to receive a spinal rod;
- b) a locking cap including an upper portion configured to engage an interior surface of the head portion and a lower portion configured to engage an exterior surface of a spinal rod received by the channel to secure the position of the head portion relative to the spinal rod upon rotation of the upper portion relative to the lower portion and the head portion; and
- 15 c) a fastener portion depending from the head portion and configured to engage the spine.

20 52. A device as recited in Claim 51, wherein the upper portion of the locking cap includes a bottom surface having an axial reception bore defined therein and the lower portion of the locking cap includes an upper surface having an axial post extending therefrom configured to engage the axial reception bore in the bottom surface of the upper portion of the locking cap.

53. A device as recited in Claim 51, wherein the channel in the head portion is bounded by opposed side walls each having an arcuate engagement slot formed therein, and the upper portion of the locking cap has opposed arcuate engagement flanges configured for reception in the opposed arcuate engagement slots of the head portion.

5

54. A device as recited in Claim 51, wherein a bottom surface of the lower portion of the locking cap includes an elongated recess oriented to accommodate a spinal rod.

10

55. A device as recited in Claim 51, wherein the head portion defines a central axis extending perpendicular to the channel, and the fastener portion is configured for angular movement relative to the central axis of the head portion.

15

56. A device as recited in Claim 51, wherein the fastener portion includes a spherical head and a threaded body depending from the spherical head.

20

57. A device as recited in Claim 56, wherein the head portion defines a seat to accommodate the spherical head and an aperture to accommodate the threaded body depending from the spherical head.

58. A device as recited in Claim 51, wherein the head portion is formed monolithic with the fastener portion.

59. A device for securing a spinal rod to the spine comprising:

a) a head portion defining a central axis and having a channel extending therethrough oriented perpendicular to the central axis and configured to receive a spinal rod;

b) a locking cap including an upper portion configured to engage an interior surface of the head portion and a lower portion configured to engage an exterior surface of a spinal rod received by the channel to secure the position of the head portion relative to the spinal rod upon rotation of the upper portion relative to the lower portion about the central axis of the head portion; and

c) a fastener portion depending from the head portion to engage the spine and mounted for angular movement relative to the central axis of the head portion.

60. A device as recited in Claim 59, wherein the upper portion of the locking cap includes a bottom surface having an axial reception bore defined therein and the lower portion of the locking cap includes an upper surface having an axial post extending therefrom configured to engage the axial reception bore in the bottom surface of the upper portion of the locking cap.

61. A device as recited in Claim 59, wherein the channel in the head portion is bounded by opposed side walls each having an arcuate engagement slot formed therein, and the upper portion of the locking cap has opposed arcuate engagement flanges configured for reception in the opposed arcuate engagement slots of the head portion.

62. A device as recited in Claim 59, wherein a bottom surface of the lower portion of the locking cap includes an elongated recess oriented to accommodate a spinal rod.

5 63. A device as recited in Claim 51, wherein the fastener portion includes a generally spherical head and a threaded body depending from the generally spherical head, and wherein the head portion defines a seat to accommodate the generally spherical head and an aperture to accommodate the threaded body depending from the generally spherical head.

10 64. A device for securing a spinal rod to the spine comprising:

a) a head portion defining a central axis and having a channel extending therethrough oriented perpendicular to the central axis and configured to receive a spinal rod;

15 b) a fastener portion depending from the head portion to engage the spine and mounted for angular movement relative to the central axis of the head portion; and

20 c) a locking cap including an upper portion configured to engage an interior surface of the head portion and a lower portion configured to engage an exterior surface of a spinal rod received by the channel to secure the position of the head portion relative to the spinal rod and the position of the fastener portion relative to the head portion upon rotation of the upper portion of the locking cap relative to the lower portion of the locking cap about the central axis of the head portion.

65. A device as recited in Claim 64, wherein the upper portion of the locking cap includes a bottom surface having an axial reception bore defined therein and the lower portion of the locking cap includes an upper surface having an axial post extending therefrom configured to engage the axial reception bore in the bottom surface of the upper portion of the locking cap.

66. A device as recited in Claim 65, wherein the channel in the head portion is bounded by opposed side walls each having an arcuate engagement slot formed therein, and the upper portion of the locking cap has opposed arcuate engagement flanges configured for reception in the opposed arcuate engagement slots of the head portion.

67. A device as recited in Claim 65, wherein a bottom surface of the lower portion of the locking cap includes an elongated recess oriented to accommodate a spinal rod.

68. A device as recited in Claim 65, wherein the fastener portion includes a generally spherical head and a threaded body depending from the generally spherical head, and wherein the head portion defines a seat to accommodate the generally spherical head and an aperture to accommodate the threaded body depending from the generally spherical head.